Request for Economic Stimulus Funds

Concept Proposal

Submitters (Name of Workgroup & Chair/Co-Chairs): **Energy and Sustainability –(Dr. Doug Whitlock and Dr. Jim Tracy)**

Project Title: **Advanced Battery Systems Laboratory**

Project Partners (Known or Anticipated): **The newly named Battery Manufacturing R&D Center (Argonne National Laboratory, University of Kentucky, University of Louisville) and WKU/Dr. Michael McIntyre**

Project Background & Purpose (Justification for Project): The mission of this project is to study the system dynamics of advanced batteries in order to meet the needs of the growing battery market. Model based approaches are gaining acceptance in many applications, including the consumer automotive market. Battery systems are an area where model-based approaches have a significant advantage over ad hoc-based approaches. With the development and usage of advanced battery systems there is an increased need for systems knowledge. As a result of this research, intellectual properties around the battery system model, signal estimation of internal signals such as state of charge, and fault detection/identification/abetment methods can be created. In concert with the research goals of the project, this environment could also be utilized to teach students about advanced battery systems.

Project Description (General Goals & Implementation Strategies): It is my desire to create an educational/research lab environment here at Western Kentucky University in the Department of Engineering to test and experiment with advanced battery technologies. Through the creation of this lab, we can develop and validate dynamic models for existing and newly created battery topologies. As part of this work, our research can develop and validate estimation strategies to determine important system information such as state of charge of the system through online measurements. While there are many ways to determine the state of charge of the battery system, many require off-line measurements. This aspect alone is critical to practical usage of battery systems. We will also use this lab to develop fault detection, identification, and abatement methods that will be crucial in complex battery systems prominent in today's hybrid electric and electric vehicle systems.

If awarded, this lab environment would be designed and assembled through the use of engineering student project(s). This would provide valuable experience to students through their

involvement with their project. I would also welcome the participation of Gatton Academy students to be involved in all aspects of these efforts.

The benefits of this work would be far reaching. Outside of the obvious benefit to the education of our student within the Ogden College through their use of this lab experience, the technologies that would be create could be valuable to the general public through the development of new battery technologies.

Project Team (Project Manager(s), Content Experts, Instructional Designers, etc.): Dr. Michael McIntyre (project manager, content expert), Dr. Stacy Wilson (content expert, instructional designers), possibly Dr. Julie Ellis (content expert, instructional designers, coming this summer)

Project Budget & Amount of Economic Stimulus Funds Requested: To complete this lab, I estimate we would need approximately $100,000. The items that would go into this lab are the following items: Advanced Batteries, Battery Load Tester (I have request for quotes out), dSPACE Data Acquisition Equipment (Matlab Hardware-in-loop) or equivalent, and Computer workstations.